

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
AS GCE  
F792/01  
GEOLOGY**

**Rocks – Processes and Products  
FRIDAY 16 MAY 2014 – Morning  
DURATION: 1 hour 45 minutes  
plus your additional time allowance  
MODIFIED ENLARGED 24pt**

<b>Candidate forename</b>						<b>Candidate surname</b>				
<b>Centre number</b>						<b>Candidate number</b>				

**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Ruler (cm/mm)**

**Protractor**

**Electronic calculator**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

**Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**

**Use black ink. HB pencil may be used for graphs and diagrams only.**

**Answer ALL the questions.**

**Read each question carefully. Make sure you know what you have to do before starting your answer.**

**Write your answer to each question in the space provided. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.**

## **INFORMATION FOR CANDIDATES**

**The number of marks is given in brackets [ ] at the end of each question or part question.**



**Where you see this icon you will be awarded a mark for the quality of written communication in your answer.**

**You may use an electronic calculator.**

**You are advised to show all the steps in any calculations.**

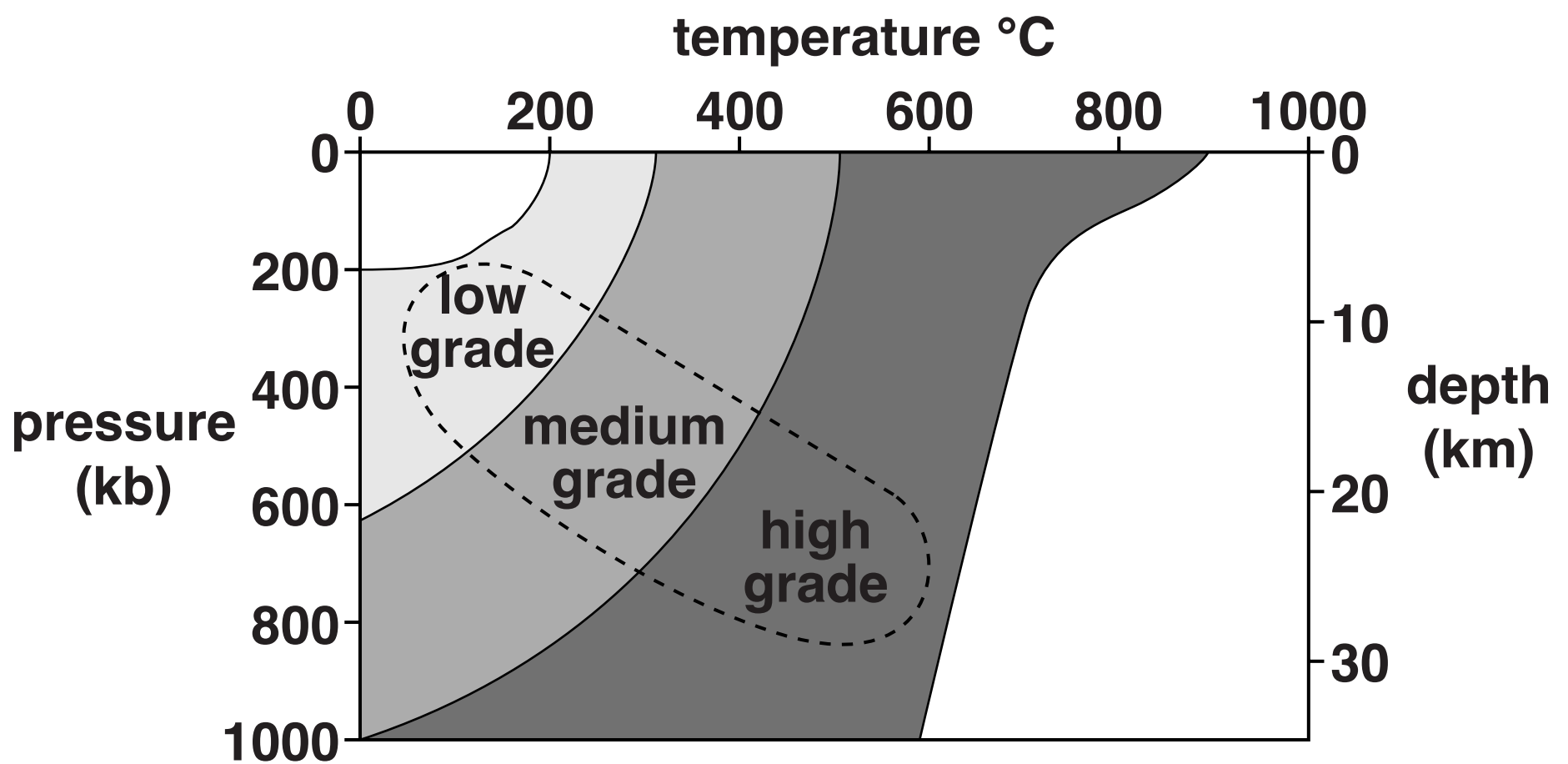
**The total number of marks for this paper is 100.**

**Any blank pages are indicated.**

**BLANK PAGE**

**Answer ALL the questions.**

- 1 (a) The diagram shows the temperatures and pressures under which the main rock groups form.**



- (i) On the diagram, clearly label the area where sedimentary rocks occur. [1]**
- (ii) On the diagram, clearly label the area where igneous rocks occur. [1]**
- (iii) Name the type of metamorphism that occurs in the area indicated by the dashed line on the diagram. [1]**
- \_\_\_\_\_
- (iv) Define the term 'metamorphic grade'. [1]**
- \_\_\_\_\_
- \_\_\_\_\_

**(v) Hornfels is a metamorphic rock that forms at high temperatures and low pressures.  
On the diagram, mark using a cross (X) where hornfels could form.** [1]

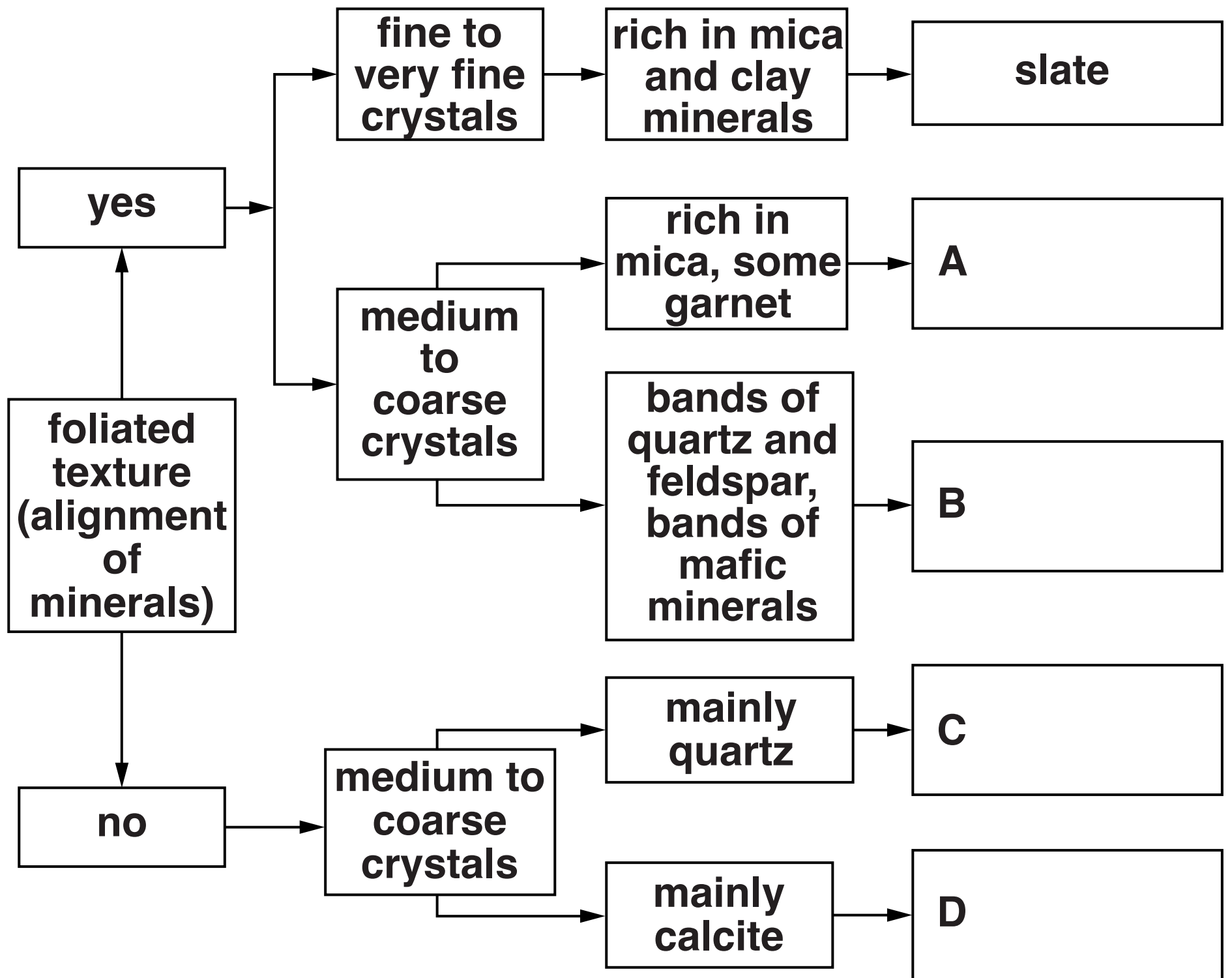
**(b) (i) Describe the temperature and pressure conditions needed for burial metamorphism.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(ii) Describe the geological conditions where burial metamorphism occurs.**

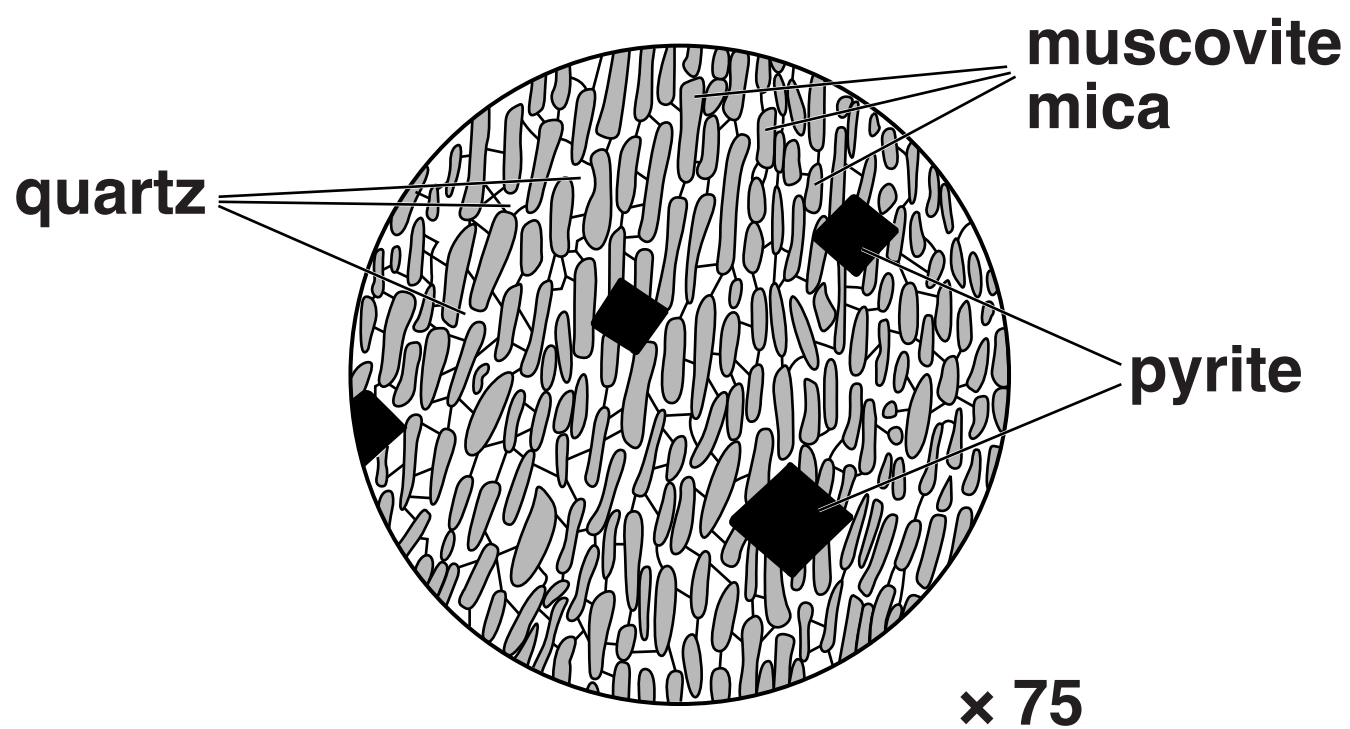
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [1]

**(c) Complete the flow diagram below by entering the names of the correct metamorphic rocks in boxes A, B, C and D.**



**[4]**

(d) The thin section diagram below is of a slate which shows two metamorphic textures. Name ONE of the textures. Describe the formation of the textures.



name of texture \_\_\_\_\_


formation of textures \_\_\_\_\_

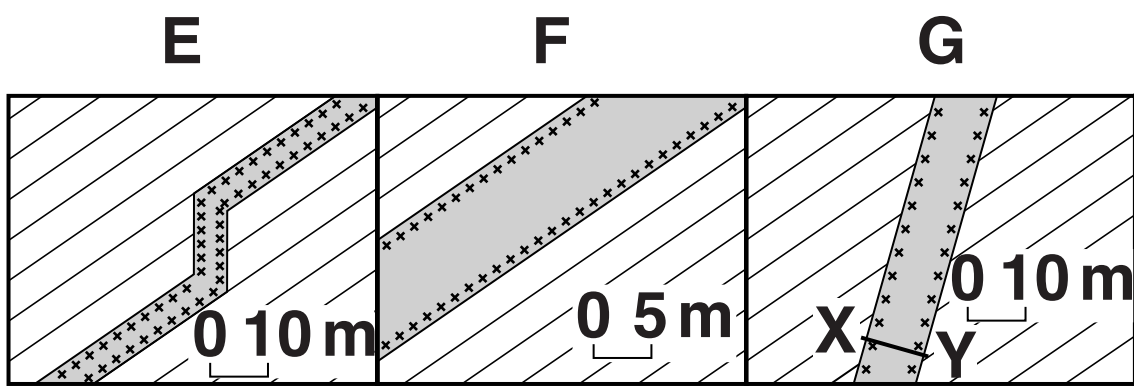
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

[3]

[TOTAL: 14]

2 (a) The diagrams below show three igneous intrusions E, F and G.

 fine grained igneous rock     medium grained igneous rock     bedding planes



(i) Use information from the diagrams to complete the table below.

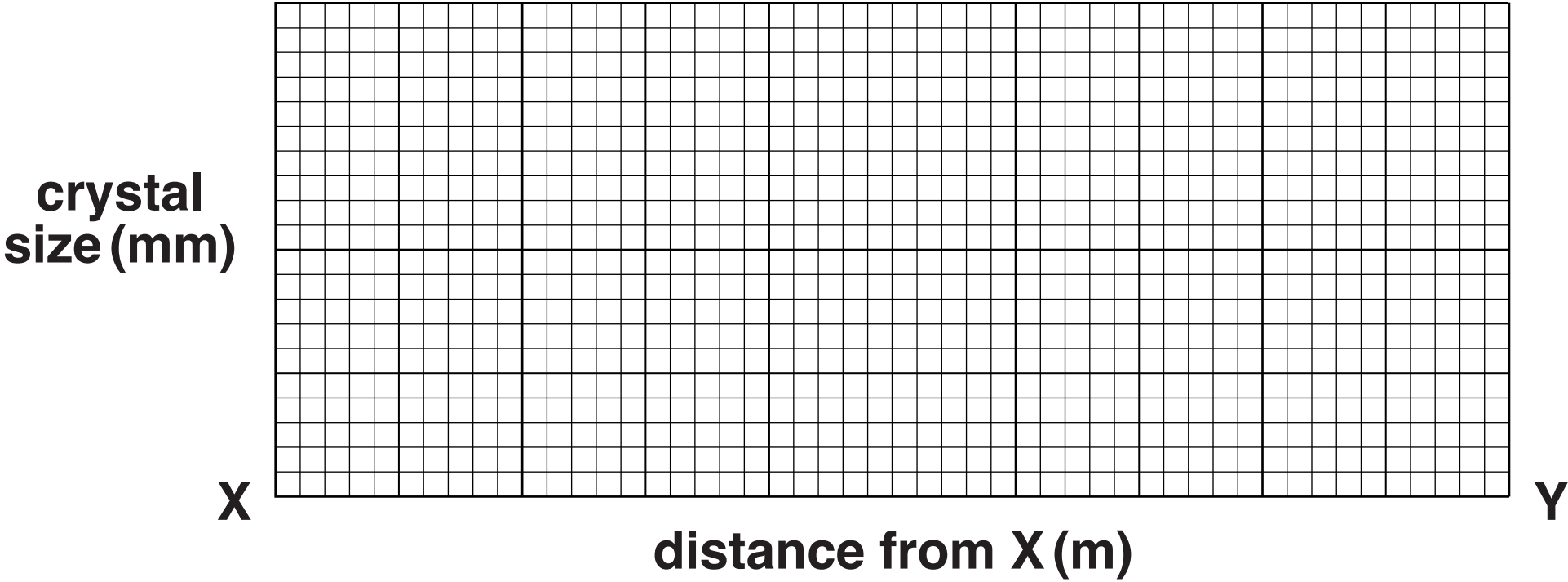
	Type of igneous intrusion	tick (✓)	
		concordant	discordant
E		✓	✓
F			
G			

[4]



(ii) The table below gives the average size of crystals from one side of intrusion G to the other along the line X to Y. Plot this data on the axes below and draw the line graph.

Distance from X (m)	Crystal size (mm)
0.3	0.4
0.5	0.6
1.0	2.0
3.0	3.5
6.0	3.8
9.0	2.0
9.6	0.8
9.8	0.4



[2]

**(iii) Describe and explain the change in crystal size across the width X-Y of intrusion G.**

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[3]

**(b) Describe ONE similarity and ONE difference between the characteristics of basalt and dolerite.**

**similarity** \_\_\_\_\_

\_\_\_\_\_

**difference** \_\_\_\_\_

\_\_\_\_\_

[2]

**(c) Draw labelled diagrams of vesicular and amygdaloidal textures and describe how the textures form.**

vesicular texture	amygdaloidal texture

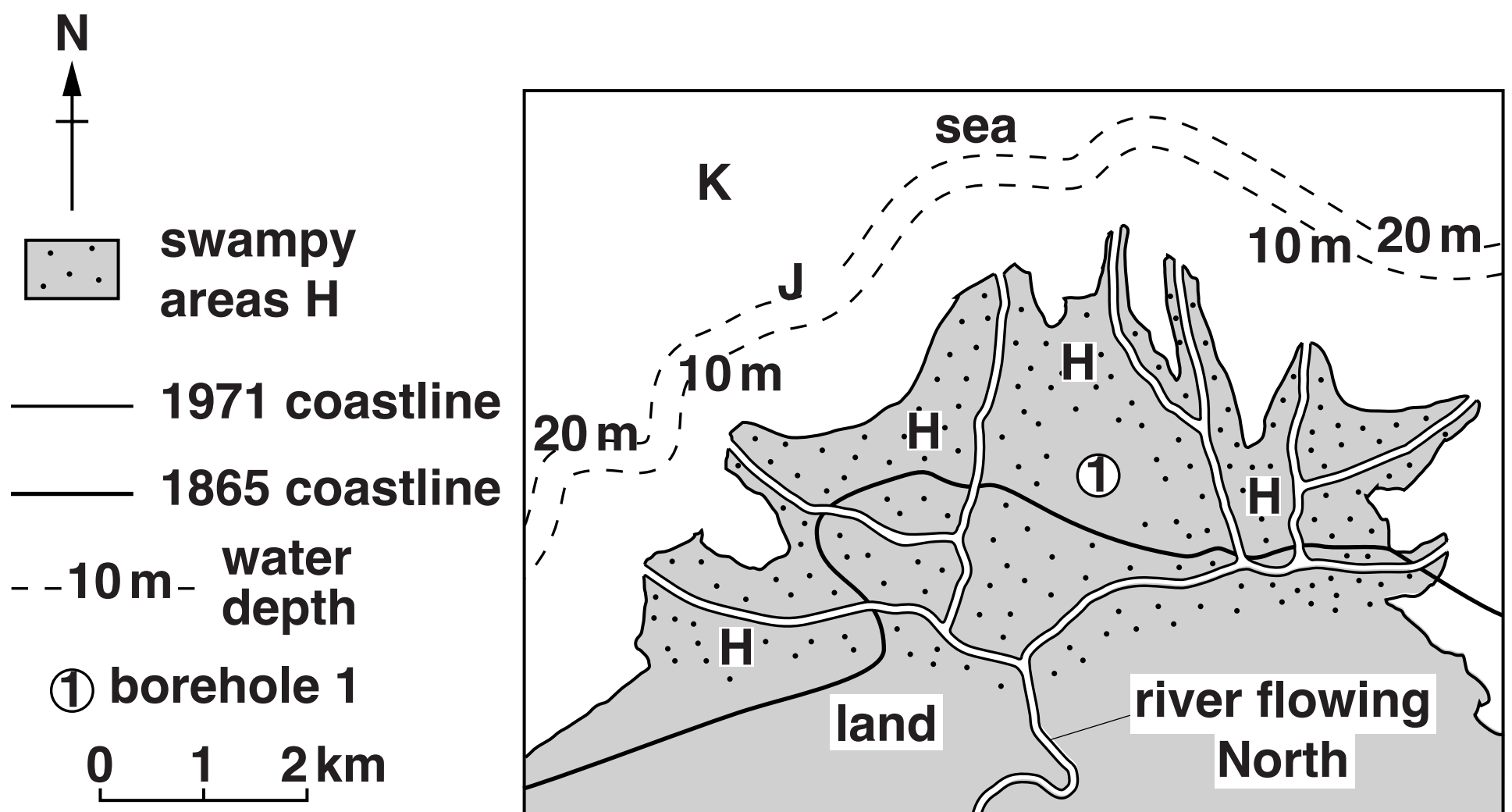
**vesicular** \_\_\_\_\_

amygdaloidal \_\_\_\_\_

[4]

**[TOTAL: 15]**

- 3 The diagram below is a 1971 map of a delta in Indonesia at a latitude of 5° South.



- (a) (i) Describe the formation of a delta.

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[2]

- (ii) State the term for the river channels that take water away from the main channel.

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[1]

- (iii) Explain what has happened to the coastline between 1865 and 1971.

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[1]

**(iv) Describe the sediments that are forming in the channels and the swampy areas labelled H.**

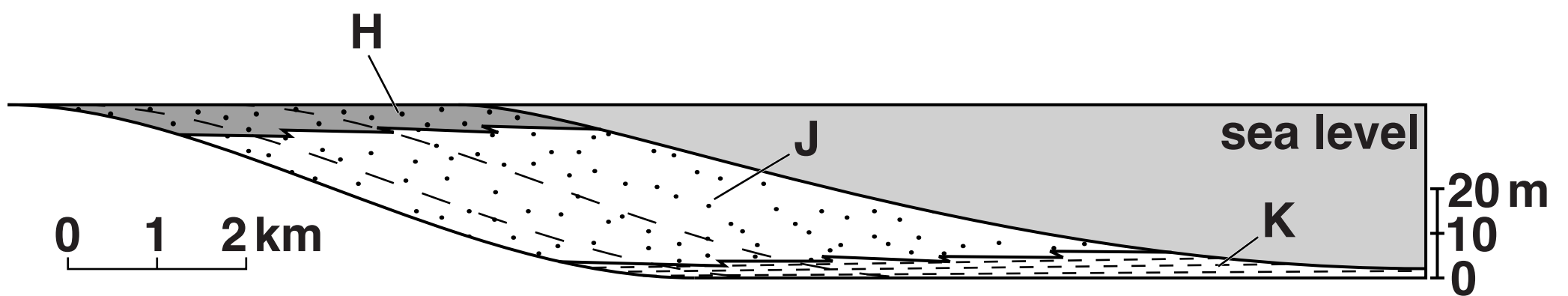
**channels** \_\_\_\_\_

\_\_\_\_\_

**swampy areas H** \_\_\_\_\_

\_\_\_\_\_ **[2]**

**(b) The diagram below shows a cross-section through the delta shown on the map.**



**(i) Name the deltaic environments H, J and K where sediments are deposited.**

H \_\_\_\_\_

J \_\_\_\_\_

K \_\_\_\_\_

**[2]**

**(ii) Draw a fully labelled vertical section to show the sediments that would form in a deltaic cyclothem.**



**[3]**

- (c) A core from borehole 1 shows that 159 cm of sediment was deposited from the start of 1865 to the start of 1971.**

**Calculate the average rate of sedimentation in cm per year.**

\_\_\_\_\_ cm per year [1]

**[TOTAL: 12]**

4 (a) (i) Sedimentary structures are used as way-up indicators and to help identify the palaeo-environments and palaeo-currents that existed when the structures formed. Complete the table below by putting a tick where the sedimentary structure is used or a cross where it is not used.

Sedimentary structure	Use as a way-up indicator	Use as a palaeo-current indicator	Use as a palaeo-environmental indicator
large scale cross bedding		✓	
desiccation cracks	✓	X	✓
graded bedding			X
imbricate structure	X		
salt pseudomorphs	X		

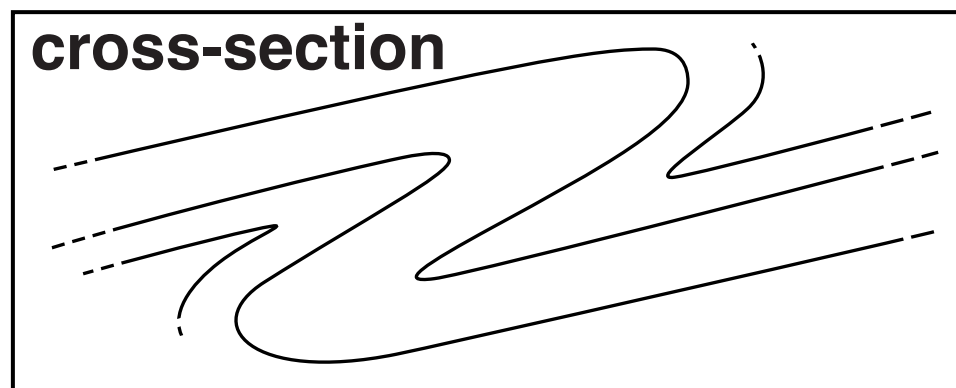
[4]

(ii) With the help of a labelled diagram(s) explain how desiccation cracks are used to indicate way-up.

[3]

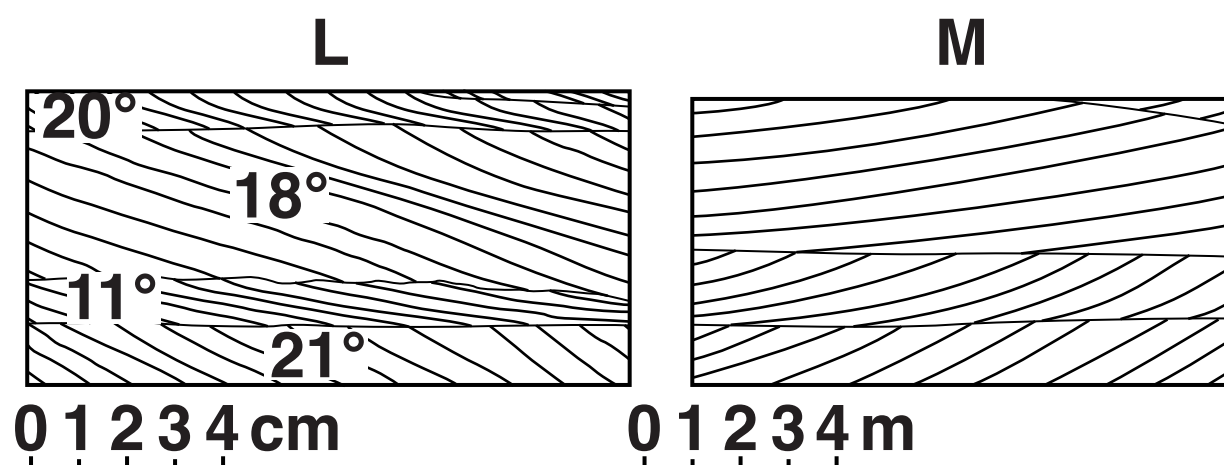


- (iii) Way-up structures are very useful to show where rocks have been inverted by folding. Draw ONE sedimentary structure on all THREE fold limbs to show the way-up. Label the top and bottom of the bed.



[2]

- (b) (i) The cross-section diagrams L and M below show two different types of cross bedding with some angles of dip. Describe the likely environment of formation for each.



L \_\_\_\_\_

\_\_\_\_\_


M \_\_\_\_\_

\_\_\_\_\_

[2]

- (ii) On each diagram above, draw an arrow to show the palaeo-current direction. [1]

**(c) With the aid of labelled diagrams describe how salt pseudomorphs form and the environment of formation.**



**environment of formation** \_\_\_\_\_

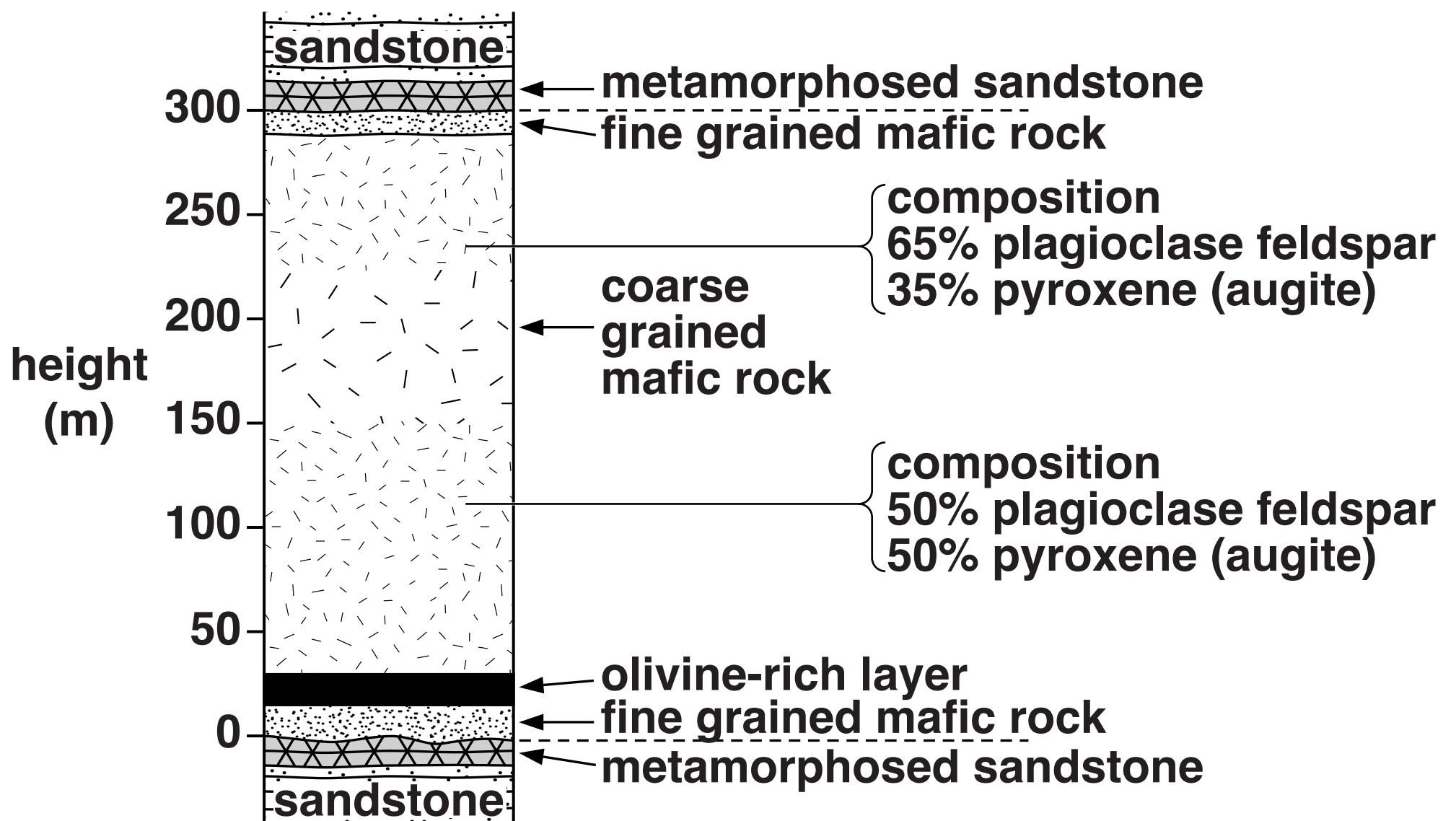
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[4]**

**[TOTAL: 16]**

- 5 (a) The diagram below shows a cross-section through a large mafic intrusion.



- (i) Suggest a name for the coarse grained rock in the centre of the intrusion.

\_\_\_\_\_ [1]

- (ii) Explain how the olivine-rich layer 25 m above the base of the intrusion formed.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ [2]

- (iii) Identify the layer of the intrusion that contains rock of the same composition as the original magma. Give a reason for your answer.**

**identification** \_\_\_\_\_

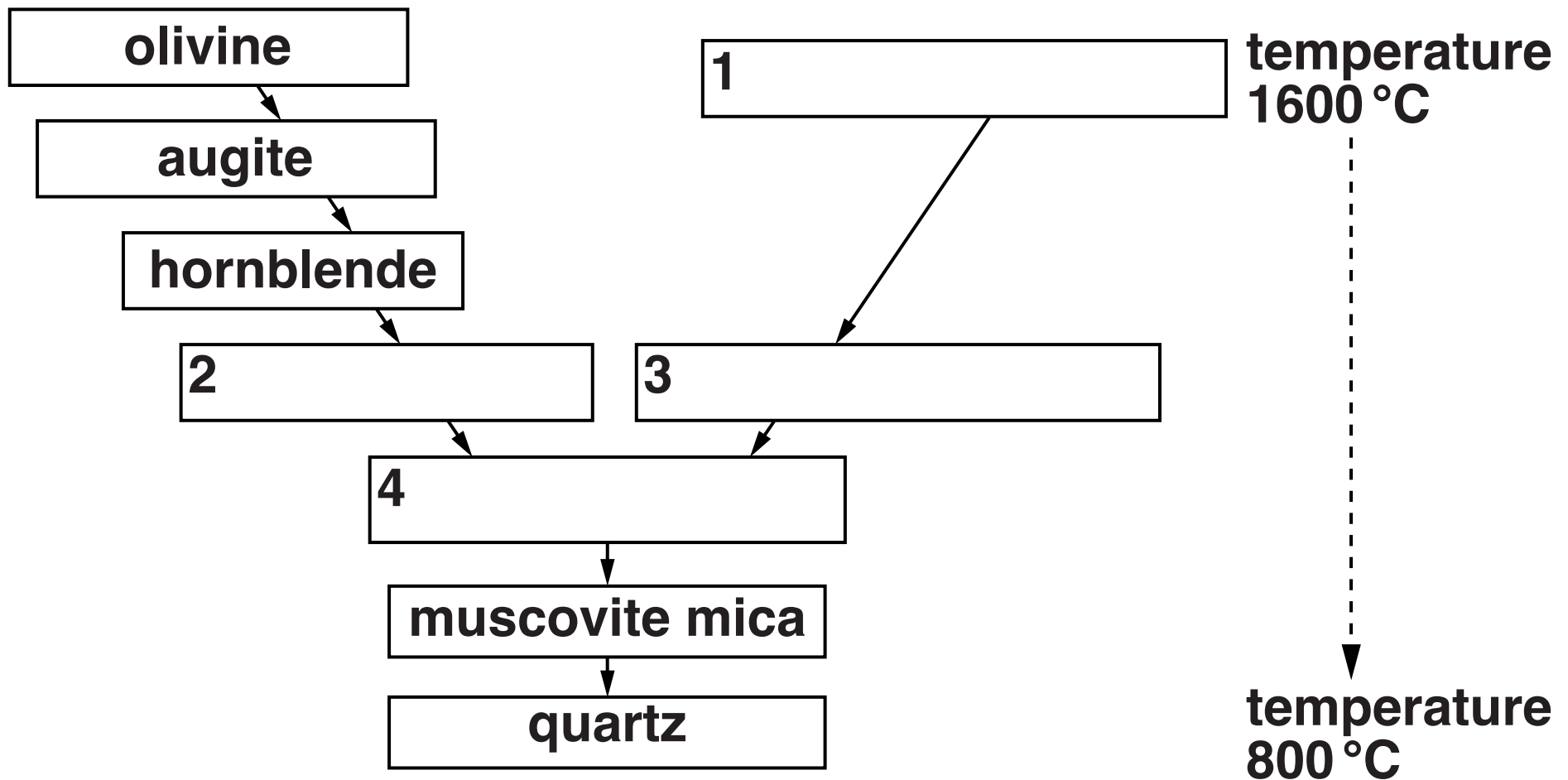
**reason** \_\_\_\_\_

\_\_\_\_\_  
[2]

- (iv) The cross-section diagram shows that the composition of the intrusion changes between 110 m and 240 m. Explain why.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

- (b) (i) The diagram below shows part of Bowen's Reaction Series. Write the correct mineral names in boxes 1–4.



[4]

- (ii) Circle the minerals that form the Discontinuous Reaction Series.

[1]

- (iii) Explain why olivine and quartz do not usually exist in the same rock.

\_\_\_\_\_ [1]

- (iv) Explain why the composition of the plagioclase feldspar may vary within an intrusion.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

**(c) Weathering can also be linked to Bowen's Reaction Series.**

**(i) State the mineral that will be most stable at the Earth's surface. Give a reason for your choice.**

**mineral** \_\_\_\_\_

**reason** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(ii) During chemical weathering of granite, feldspar is broken down to form clay minerals and solutes.**

**Name this type of chemical weathering and explain how the SOLUTES form.**

**name** \_\_\_\_\_

**explanation** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(d) Chemical weathering of limestone is by carbonation.  
Describe this weathering process.**

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**[2]**

**(e) State TWO processes of mechanical weathering.**

1 

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2 

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**[2]**

**[TOTAL: 23]**

## 6

## grain size

## grain shape

## mineral composition

# fossil content

**can be used to classify clastic and non-clastic sedimentary**

**[10]**



**In your answer you must use examples of named rocks for each method of classification.**

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**[TOTAL: 10]**

**QUESTION 7 BEGINS ON PAGE 27**

**7 Describe and explain the distribution and type of volcanic products from MAFIC volcanoes and INTERMEDIATE volcanoes. You may use diagrams to illustrate your answer.**



**In your answer you should refer to lava type and pyroclastics.**

[illegible]

[illegible]

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**[TOTAL: 10]**

**END OF QUESTION PAPER**

## ADDITIONAL ANSWER SPACE

**If additional answer space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margins.**

[illegible]






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